ABSTRACT:

Utilization of microbes including white-rot fungi and bacterial strains for decolorization of synthetic dyes is one promising strategy of an environmentally friendly and cost-competitive alternative to physicochemical decomposition processes for treating industrial effluents. In this study, the biodegradation ability of the white-rot fungi Polyporus sp. S133 that produce high laccase was investigated in order to decolorize anthraquinone-type dye. Parameter including pH, temperature, and non-ionic surfactant were used to comparatively study the decolorizing effects on Remazol Brilliant Blue R (RBBR). The purified laccase totally decolorized 200 mg L -1 initial concentration of RBBR dye when only 1.5 UL -1 of laccase was used in the reaction mixture. The optimal decolorization rates were achieved at pH 5 and at a temperature of 50°C. N-hydroxybenzotriazole, a small molecular weight redox mediator, was found to accelerate the decolorization. Tween 20 inhibited the decolorization while Tween 80 and Brij 35 showed no inhibition effect. Two compounds were identified as the intermediates (m/z 304.3 and m/z 342.2). These results suggest that laccase from Polyporus sp. S133 is a powerful tool for the decolorization of anthraquinone dyes. A pathway for the metabolism of the RBBR by laccase of Polyporus sp S133 was proposed. These proposed pathways could contribute to a better comprehension of the mechanisms used by oxidative enzymes to transform organic compounds.